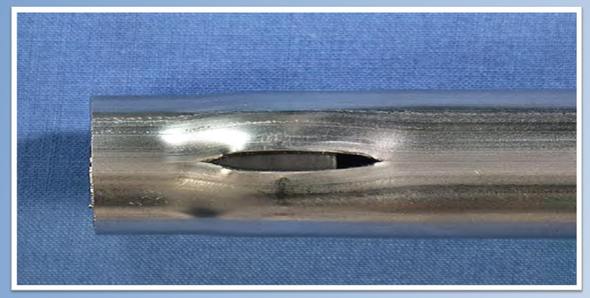
XXIII Twenty Third Annual engineering ▪ design expo 2016

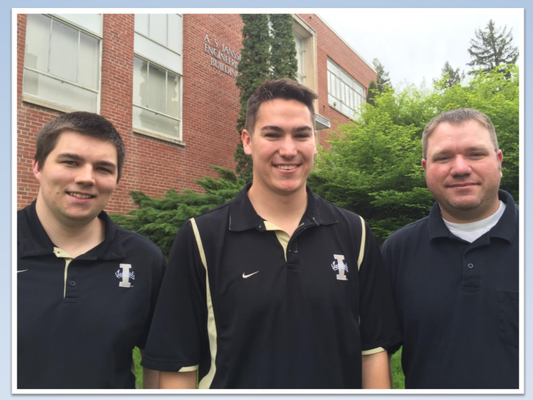
Heat Exchanger Tube Removal Technology

University of Idaho
College of Engineering

Problem

During the manufacturing process of the heat exchangers, tubes are expanded using hydraulic pressure. Occasionally a tube will rupture and need to be removed.





Tony Keys Andrew Roybal Alan Edwards
Mentor: Jake Gilles
Advisor: Dr. Michael Maughan

Goals and Constraints

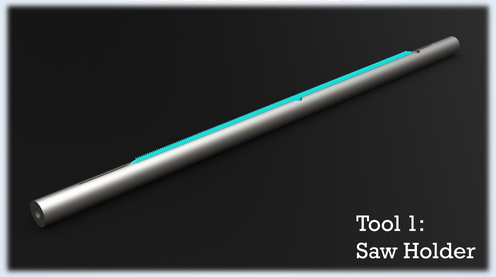
Create a tool/process capable of removing aluminum tubes that have been expanded into a coil core. The team set a 30 minute goal for removal time.
Constraints for the tool design are as follows:

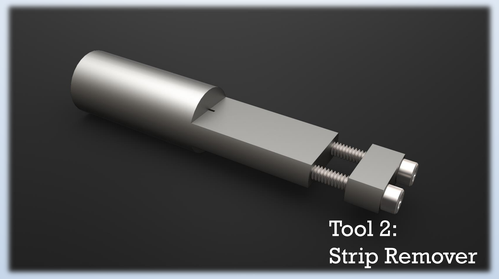
- 320" maximum tube length
- 5/8", 7/8", 1" tube diameters
- Tool must be safe, reliable, durable, and quickly/easily operated
- Minimal fin and coil damage to promote installation of new tube.

Workspace

The tools are designed to be pulled through the heat exchanger using a winch system

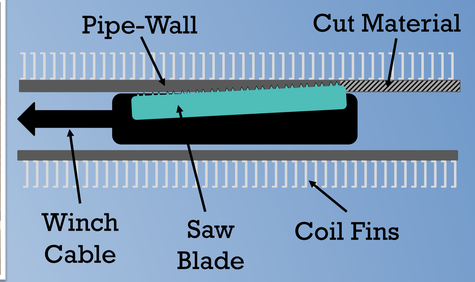
Tool Series



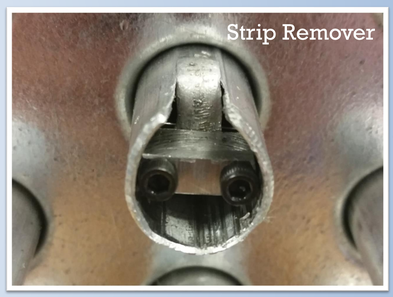


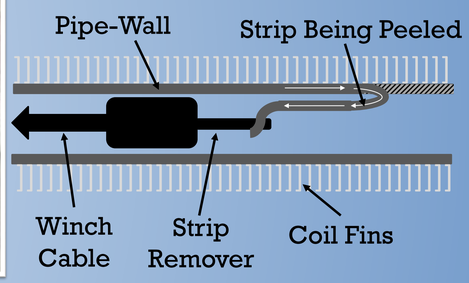
COLMAC COIL Manufacturing Inc.

Removal Process

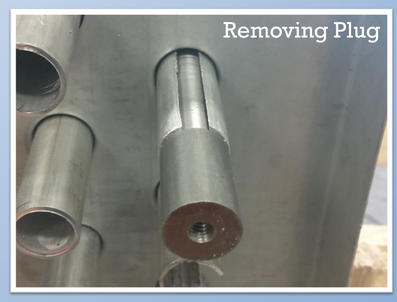


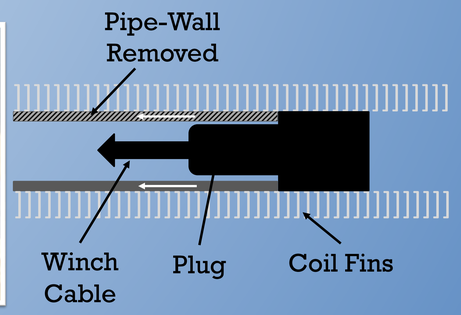
The saw holder creates parallel cuts along the inside of the tube. The cut must be consistent width for the next step.





The last couple inches of the strip are folded into the strip removal tool and securely clamped. The forward motion peels the strip from the pipe wall and out of the tube.





The body of the removing plug fits inside the tube. The outer diameter of the plug is equal to the outer diameter of the pipe. With the strip removed, the plug is able to extract the pipe from the coil.